

## **IMPROVING THE QUALITY OF SOCIAL ARITHMETIC LEARNING PROCESS AND ACHIEVEMENT USING MULTIDISCIPLINARY APPROACH**

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### **Abstract**

The objective of research was to find out how the multidisciplinary approach in social arithmetic learning could improve the quality of learning process into the joyful and meaningful one and the student learning achievement.

This research was conducted in two cycles. Each cycle involved four stages: planning, acting, observing, and reflecting. The indicators of performance in this research were: (1) there was indication of improvement in the students' joyful and meaningful learning process in the result of observation, questionnaire, and interview, (2) there was an improved learning achievement indicated by the mean score of tests showing that at least 80% students obtained score higher than the minimum passing criterion (78). The subject of research was the 7<sup>th</sup> graders of SMPN 1 Wonosari, consisting of 24 students. The data of learning process was taken using questionnaire, observation, and interview. Meanwhile the data of learning achievement was taken using pretest and posttest. The data of learning process was processed and presented descriptively. The data of test result was processed and presented quantitatively.

The result of research showed that having passed through 2-cycle learning process in which reflection was conducted, it could be seen the improvement of learning process and percentage learning outcome passing. The students enthusiastically explored information, planned, implemented, communicated an idea of business, estimated profit-loss and discount, and designed the follow-up of business outcome. The percentage passing of prior condition, cycle I, and cycle II was 25%, 62.5%, 95.8%, respectively. In addition to improving the percentage passing, there was also an increase in the mean class score of achievement test result of 62.9, 77.5, and 82.9, in prior condition, cycle I, and cycle II respectively. It could be seen that all of three performance indicators were achieved from prior condition to last cycle. So, the conclusion of research was that multidisciplinary approach in social arithmetic learning could improve the quality of learning process into the joyful and meaningful one and learning achievement in the 7<sup>th</sup> graders of SMPN 1 Wonosari of Gunungkidul Regency in the school year of 2014/2015.

**Key words:** multidisciplinary approach, social arithmetic, mathematics.

### **INTRODUCTION**

The 2013 curriculum contains integration of various aspects into mathematic learning. The integration of religious values, nation character, and mathematic knowledge is written clearly in the syllabus of math learning syllabus of 2013 curriculum. Knowledge aspect is explained in detail in the third main competency: understanding, applying, and analyzing factual, conceptual, procedural, and metacognitive knowledge based on curiosity on science, technology, art, culture, and humanities with humanity, nation, state, and civilization insights related to the cause of phenomena and event, and applying procedural knowledge to specific study area corresponding to talent and interesting solving problem. In other words, to present an

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intact, joyful and meaningful learning, a variety of aspects interesting to the students and close to real life should be integrated. This notion is in line with Brunt (1998) stating that learning will provide the best output when the learning is meaningful, challenging, has opportunity of interacting socially, and is joyful to the students. Thus, the teacher should design learning in order to be acceptable to the students, the meaningful and joyful learning according to the students' own thinking level and potency.

The essence of learning is to find solution to every problem of life. Thus, math learning should facilitate the students solve the real problems in their life. Unfortunately, in the field, many math learning processes are still target material-oriented without taking into account the learning meaningfulness to the students. It can be understood that the teacher's administrative demand constituting the development of learning along the year emphasizing on writing order is still felt incriminating. Even learning process is frequently ignored only to cope with administrative demands. Nevertheless, teacher, as a profession replete with mandate (*amanah*), should deal with all of those demands precisely, creatively, and innovatively. For that reason, the writer tries to innovate in designing a joyful, challenging, and meaningful social arithmetic learning to students, to make it implemented despite limited time.

Social arithmetic is one of materials in math learning for Junior High School (SMP) very close to real problem related to profit, loss, discount, sale, and purchasing. This material can be presented contextually and then after the learning process leading the students to definition of profit, loss, discount, sales, and purchasing, the learning can be led to mathematic symbolic language, One-Variable Linear Equation. However, based on the analysis of effective day in the school year of 2014/2015 adjusted with the amount of material imposed on the math subject in the second semester of seventh grade of Junior High School, it can be found that it is impossible to implement the social arithmetic learning scenario in the real problem practice. For that reason, the writer initiates to take multidisciplinary approach. The multidisciplinary approach intended is to integrate the social arithmetic learning into working, entrepreneurship, communication, and business proposal and report writing skills. Meanwhile, the quality of learning process refers to a joyful and meaningful process to the students. In addition, the learning is also integrated into the content of reporting project result either verbally, orally or in written through written report and presentation with PowerPoint.

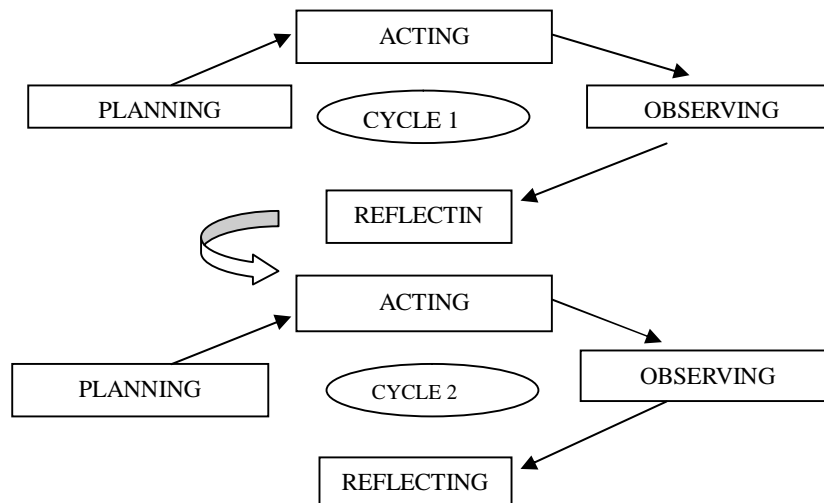
In vocational (*prakarya*) subject according to the 2013 curriculum, the seventh graders are trained to produce fresh beverage, *lutis* (a kind of food made of various fruits and chili sauce) and other various healthy, nutritious, salable food. Such the condition is very appropriate to social arithmetic material schedule, so that it can be integrated. This integration aims to make learning more meaningful and joyful because the students learn real problem, develop plan, and implement it, solve the real problem, and define the definition of profit, loss, discount, sale, and purchasing by themselves. In addition, the problem of limited time frequently complained in the implementation of 2013 curriculum will be solved.

## RESEARCH METHOD

This study was a classroom action research. It was implemented in collaboration with the teacher of *prakarya* subject for the seventh F grade of SMP N 1 Wonogiri, in the even semester in the school year of 2014/2015. This Classroom Action Research was conducted in two cycles, each of which involved: planning, acting, observing, and reflecting. Cycles I and II were conducted in 7 math lesson hours and 2 *prakarya* lesson hours respectively, with one lesson hour lasting for 40 minutes. The instruments used were author, observation, interview,

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and test. The research model used was John Elliot's action research model, as illustration in Figure 1 below.



**Figure 1. John Elliot's Action Research Model**

## RESULT AND DISCUSSION

Arithmetic learning presented real problem integrated into *prakarya* material; in cycles I and II, generally in initial stage, the students got pre-test containing 10 questions concerning profit and loss of fresh beverage sellers. In this stage, some students indicated as incapable of solving the problems as could be seen from the answer result in pretest. The percentage passing with Minimum Passing Criterion of 78 was 25%, with the mean score of 62.9. However, based on the result of test and interview, it could seen that two students could solve the problem with comparison concept they obtained in odd semester. It means that the students could connect their previous knowledge to new material they have not learnt yet. The students could solve new problem using other concepts they have learnt. The fact is a good indication, that the comparison they had passed through was meaningful, so that they could solve new problems. In addition, some students could solve the problem with a long graduale way, but they communicated their idea less clearly. Several students suggested that they imagined the problem difficultly because they have never sold anything. In other words, the students felt difficulty since they had no selling experience.

Considering the result of pre-test, interview, and observation in initial stage, the author designed a social arithmetic learning by providing real problem, giving the students the opportunity of working in group to explore and to design trading business plan integrated into *prakarya* class job, exploring the fresh beverage sellers. In cycle I, the activity was started with giving social arithmetic job integrated into *Prakarya* job. The author as the math teacher coordinated with *prakarya* job to equate perception, schedule sharing, student job, learning plan. *Prakarya* job asked the students to try buying the sold-out and delicious fresh beverage in school environment, and then asking the composition of fresh beverage to the sellers in order to be practiced in the seller's place in order to explore information on business capital, raw material purchasing price, pricing, and trading strategy from the beginning until getting profit.

The exploration activity was conducted out of either math or *prakarya* learning hour. The result of exploration and field observation was reported in a format corresponding to arithmetic job, exploration report and business design of business plan for fresh beverage selling including: description of exploration result, design of job division for the members: in selling preparation stage, fresh beverage production, selling, and selling result report, designing the

cost requirement, designing target selling, and designing trading strategy. Business report and design were done in the class in math hour, presented and discussed classically in social arithmetic learning. Classical discussion in this first cycle got enthusiasm from all of students. The students' questions were very varied around the reason of choosing the type of beverages, daily capital, daily profit, market, target market, strategy used, daily sales volume, profit obtained. Discussion ran effectively and loosely. Table 1 contained activity agenda in cycle I and II.

**Table 1. Classroom Action Research in Cycles I and II**

No	Learning Activity	Time allocation 1 lesson hour= 40 minutes	Subject
1	Social arithmetic pretest	1 lesson hour	Math
2	Reflection and explanation of activity agenda	1 lesson hour	Math
3	Explanation of exploration during <i>Prakarya</i> lesson hour	2 lesson hours	Prakarya
4	Exploration & report writing	-	Out of lesson hour
5	Presentation of field exploration result and design for fresh beverage business	3 lesson hours	Math
6	Cycle 1 test, reflection, and explanation of subsequent agenda	2 lesson hours	Math
7	Producing fresh beverage according to business design and exploration report.	2 lesson hours	Prakarya
8	Fresh beverage selling	20 minutes	Resting time
9	Report writing and powerpoint report dir presentation.	3 lesson hours	Math
10	Presentation of fresh beverage selling result	2 lesson hours	Math
11	Cycle 2 test, reflection and conclusion	2 lesson hours	Math

In this cycle 1, no students questioned the percentage profit wanted in the business plan. Realizing this, the author, as the teacher questioned it to all of groups. However, no student wrote it in initial report. Then the students asked the students why they had not included it yet. In fact, nearly all of students were confused, and had not estimated the percentage profit. Meanwhile, they could mention it, for example, when they convey the percentage profit obtained from daily sellers from exploration result. It means that the students knew it or could state it only as information from the seller, but had not understanding it yet. For that reason, the teacher reminded them by asking questions around the percentage presence of student in 1 month. Here is the quotation of classical discussion in the classroom during Cycle 1.

*Teacher : For example, in 1 month, there are 30 days, Deva, the 7<sup>th</sup> grader always goes to school and she has never been absent. What is the percentage of Deva's presence?*

*Students : 100%...!!! (the students answered in unison)*

Then the teacher continued asking:

*Teacher : Some day, Deva is ill, so that in 1 month she does not go to school for 15 days, what is the percentage of her presence?*

*Students : 50% ...!!! (some students answered in unison)*

But some students asked questions immediately:

*Students : What number of days in 1 month, Mom?*

The teacher did not answer the question soon, instead, she even asked the students

*Teacher : Why do you ask the number of days in one month? Is it important?*

*Student : Yes mom, to find out the proportion of 15 absent days compared with*

- A : *the total days in a month.*
- Teacher : *See! It means that you can estimate the percentage presence, try to write it on the blackboard and explain to your classmates....*
- But Student A did not come to the front, she only answered orally
- Student : *For example, when 1 month consists of 30 days, it means that 15 days is a half of it, so that it is 50%...*
- A : *is a half of it, so that it is 50%...*
- Teacher : *OK!. Very good, but your friends seem to be incapable of write it, please write it on the blackboard to make your friend understanding.*
- Student : *Ehm... I am confused to write it Mom ... (several students made murmur and said the same thing)*
- A : *(coming to the front suddenly and writing it) it may be like this Mom:*
- B :  $\frac{15}{30} = \frac{1}{2}$  ... *(ehm,...seemed to be confused and regressed gradually)*
- Student : *That is a half, not 50 %,....*
- A :
- Student : *A half is 0.5, not 50%....*
- C :
- Student : *I know Mom (coming to the front and writing on the blackboard)*
- A :  $\frac{15}{30} \times 100\% = 50\%$
- Student : *Yes Mom, just like that...!!!! (the atmosphere became crowded)*
- Teacher : *OK! Attention please (while clapping loudly 3x, as the sign that the students should be calm and refocus their attention, ... very good, what about Deva present in only 10 days a month, what is her percentage presence?*
- Student : *(answering in unison) 30 %...!!!*
- Teacher : *Correct. Now, what about percentage profit?*
- All of students were silent, some of them invited their friend to discuss ...
- Student : *We are confused about profit Mom,....*
- D :
- Teacher : *OK! Look at the blackboard,... (pointing to  $\frac{15}{30} \times 100\% = 50\%$  ). Remember again, what the number 15 stands for, what the number 30 stands for, that why it is multiplied by 100%?*
- Student : *15 is the number of absence, 30 the number of days in a month, 100% is ...*
- A : *is ...*
- Student : *100% is when all of it is met, the total 100%, like that Mom....????*
- B :
- Teacher : *What is met?...*
- Student : *Target number of presence day Mom,....???*
- B :
- Student : *It may be like this Mom, when Deva is present for 30 days, it means 100%, 15 days, 50%, so it is just like a comparison with same value, Mom,...???*
- E :
- Teacher : *Very good,...please write your idea on the blackboard,...*

*Student : (coming to the front and writing on the blackboard....)*

Percentage	Day	Percentage absence
$x$	15	$\frac{x}{100\%} = \frac{15}{30}$ $x = \frac{15}{30} \times 100\%$
100%	30	

*Teacher : Great! Very good..., then what about percentage profit...?*

All of students kept silent,...

*Student : What means by total or maximal to be reached in profit, Mom? The amount of money or what Mom,...*

All of students kept silent,...

*Student : Is it capital Mom,....? ehm...it means that 100% is the amount of capital, isn't it Mom?*

*Student : Yes Mom,... It means that profit is estimated from the capital...*

A

Considering the result of observation and field not in Cycle 1, the learning with presentation of field exploration result, following with group discussion and classical discussion, can stimulate the students' enthusiasm in learning to understand social arithmetic. In addition, the students become creative in designing the fresh beverage business, as can be seen from the opinions and questions between the students when pouring their idea of trading strategy, target consumer, and target selling. The students' creativity and attempts of discovering definition, connecting to previous knowledge are felt strongly in both classical and group discussions. Classical discussion was continued with oral question about percentage profit from the teacher, for example, to get 50% profit, what cups should be sold with the cost of IDR 3000,- per cup? and so on. The questions would be answered by the students who were not presenting, but when no one answered, it should be explained classically by the presenting group. In cycle 1, the process result showed good development, while the result of pretest 1 showed that the percentage passing with Minimum Passing Criterion (KKM) of 78 was 62.5%, with the mean score of 77.5. This result is sufficiently good, but the mean class score was still lower than KKM and the percentage passing had not reached 80% yet. For that reason, cycle 2 was carried out with action improvement according to the result of reflection.

Considering the result of reflection from students and teacher, and observation result analysis, it could be found that the students needed concrete experience in order to understand the definitions of social arithmetic. For that reason, in cycle 2, the activity of implementing the students' business plan would be arranged. Exploration report and design made would be implemented really in the school. In Prakarya hour for 2 lesson hours, the students would prepare fresh beverage according to their design, then during resting time, they would sell it. Next, during math lesson hour, the students wrote their report and presented the result.

In cycle II, it could be found from the result of process, based on observation result and field note, that the students were very enthusiastic, enjoying, and happy particularly when offering their product. Even during presenting the activity result, all of students were very cheerful. They said bravely that their business was lost; by contrast, the students reaching 100% profit talked about it very cheerfully in their presentation. The students document it creatively in the form of photograph and video in the powerpoint they prepare. The students told that they were originally pessimistic to get large profit, because the school time was changed suddenly. Because the teachers had sudden agenda to go out of school, so there was no resting time. It



means that the target consumer the students aimed at to buy their product, in this case the teacher, absolutely failed. However, those students found an idea to sell their product to their seniors who were waiting for extra lesson time in the evening. The result was great, out of four Prakarya groups, only one was lost in trading.

After the students practiced to sell, they were given an opportunity of pouring all of their activities into a report containing the ratio of the original plan to the realized one in the field. The students reported and documented all of activities in detail, including job division, shopping budget, raw material purchasing price, and income. The presentation activity was followed by classical discussion, teacher asked further questions after the students and presenter carried out debriefing completely. From process aspect, in cycle II, there was a great increase in students' response, and enthusiasm, and spirit in completing the project was observed clearly.

In this stage, the unique point to be focused on was no longer the problem of percentage profit or loss, but in business capital reporting process. Several students questioned the capital reported in detail. It was related to the remaining materials that were not reported as capital, so that it was considered as resulting in the smaller capital value so that the loss would be small or when it was profitable, the profit would be very large. Several students required the real estimation of profit when the remaining materials were included into capital. But some groups said that the remaining materials were bought by the members, so that it could not be included into capital. Seeing the students' enthusiasm, precision, and critical thinking in this second cycle is very enlivening. It means that the objective of classroom action has been achieved, to improve the learning process so that the process becomes higher in quality, more joyful and meaningful to the students. The result of test in second cycle was very good; the percentage passing with Minimum Passing Criterion (KKM) of 78 was 95.8%, with the mean score of 82.9. Some students still made error in their imprecision and inconsistency in writing answers, thereby resulting in fault in the final estimation result.

## **CONCLUSION AND SUGGESTION**

Considering the result of Pretest, Cycle I and Cycle II, it can be concluded that multidisciplinary approach in social arithmetic learning can improve the quality of learning process into the meaningful and joyful one and learning achievement of the seventh F graders of SMP N 1 Wonosari of Gunungkidul Regency in the school year of 2014/2015.

The recommendation give to similar studies is that to confirm the result, the study can be continued to cycle III, by entering into One-Variable Linear Equation. In the 2013 Curriculum, this material becomes one of subject matter with social arithmetic. The problem drill should be added to improve the mastery social arithmetic problem solving skill.

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